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(54) Title: DISINFECTANT COMPOSITIONS

(57) Abstract

A disinfectant composition which is compatible with foodstuffs and beverages, said composition comprising: (a) an anionic surfactant chosen from an alkali metal salt of a C_{10}-C_{18} alkyl sulphate and an alkal metal salt of di(C_6-C_{10} alkyl) sulphosuccinate; (b) an acid selected from citric acid, phosphoric acid, sulphuric acid, hydrochloric acid, acetic acid, gluconic acid, lactic acid, propionic acid, malic acid and tartaric acid; and (c) a non-ionic surfactant which comprises a polyethoxylated sorbitan ester which is readily soluble in water.

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DISINFECTANT COMPOSITIONS

FIELD OF THE INVENTION

The present invention relates to disinfectant compositions, in particular to disinfectant compositions which are compatible with foodstuffs and beverages.

BACKGROUND OF THE INVENTION

There is a need in the processed food industry for disinfectants in liquid form which are compatible with foodstuffs and beverages, and which are stable when diluted with hard water and/or are stable when a concentrate of the disinfectant composition is stored. Ideally, the concentrate should remain stable for at least 3 months at room temperature, and more preferably for at least 2 months at -1°C.

As far as we are aware, there are no disinfectant compositions currently on the market which are food compatible and which at the same time are stable when diluted in hard water or in which a concentrated form of the disinfectant is stable for periods of 2 months or more, particularly at low temperatures, typically at temperatures down to -1°C.

Canadian Patent No. 1244759 discloses that the combination of alkyl sulphonates and/or alkyl sulphates with one or more specifically mentioned organic acids displays an unexpectedly broad spectrum of microbiocidal and virucidal activity in very low use concentrations at which the individual components of the combination do not exhibit any microbicidal activity.

US Patent No. 3650964 discloses sanitizer compositions intended to have low foaming properties. Anionic surface active agents are combined with an acid and may also contain a solubilising agent and/or a low foaming non-ionic surface active agent.

W092/09260 discloses sanitising compositions which comprise an anionic surfactant and an acidic component. Non-aqueous concentrates are disclosed which may be in the form of a solid dry composition or in the form of

a liquid mixture in an anhydrous liquid carrier. Solutions of the compositions are found to have excellent antibacterial activity.

DE-A-3519557 discloses skin disinfectant compositions which incorporate a non-ionic surfactant, a diluting agent and, preferably, a benzyl-substituted quarternary ammonium compound. The compositions are reported to be only mildly biocidal.

It is also well known that certain anionic surfactants act as microbiocidal agents when acidified.

We have now found that incorporation of certain soluble non-ionic surfactants into compositions of acidified anionic surfactants produces disinfectant compositions which are stable when diluted with hard water.

SUMMARY OF THE INVENTION

According to the present invention there is provided a disinfectant composition which is compatible with foodstuffs and beverages, said composition comprising:-

(a) an anionic surfactant chosen from an alkali metal salt of a C_{10} - C_{18} alkyl sulphate and an alkali metal salt of di (C_6 - C_{10} alkyl) sulphosuccinate;

(b) an acid selected from citric acid, phosphoric acid, sulphuric acid, hydrochloric acid, acetic acid, gluconic acid, lactic acid, propionic acid, malic acid and tartaric acid; and

(c) a non-ionic surfactant which comprises a polyeth-oxylated sorbitan ester which is readily soluble in water.

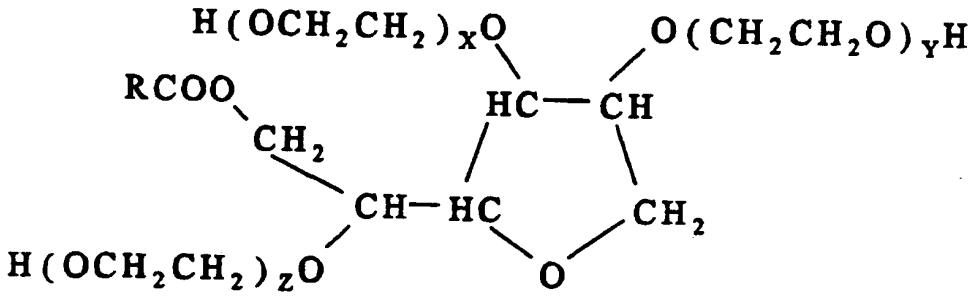
The anionic surfactant used in the disinfectant compositions of the present invention is preferably sodium lauryl sulphate or sodium dioctyl sulphosuccinate.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The amount of anionic surfactant (a) which is usually present in the disinfectant compositions of the present invention is from 1 to 20 wt%,

preferably from 5 to 9 wt%, more preferably about 7 wt%, based on the total weight of the disinfectant composition.

The non-ionic surfactants (c) which are incorporated in the disinfectant compositions of the present invention are polyethoxylated sorbitan esters which are soluble in water. These materials have the following general structural formula (I):-



wherein R is the alkyl group of a fatty acid, typically a C_{12} - C_{18} fatty acid such as lauric acid, palmitic acid, stearic acid and oleic acid, and (x + y + z) is the total number of moles of ethylene oxide.

Preferably the non-ionic surfactant (c) comprises a polyethoxylated sorbitan ester selected from ethoxylated sorbitan monolaurate, ethoxylated sorbitan monopalmitate, ethoxylated sorbitan monostearate, and ethoxylated sorbitan mono-oleate. Particularly preferred such polyethoxylated sorbitan esters are those containing 20 moles of ethylene oxide.

Especially preferred non-ionic surfactants of this type are Polysorbate 20, Polysorbate 40, Polysorbate 60 and Polysorbate 80. Three of these Polysorbate compositions are described in the Food Chemicals Codex, 3rd Edition, 1981, National Academy Press, Washington DC, as:-

> Polysorbate 20 is a mixture of laurate partial esters of sorbitol and sorbitol anhydrides condensed with approximately 20 moles of ethylene

oxide,(C_2H_4O) for each mole of sorbitol and its mono- and di-anhydrides.

Polysorbate 60 is a mixture of stearate and palmitate partial esters of sorbitol and sorbitol anhydrides condensed with approximately 20 moles of ethylene oxide (C_2H_4O) for each mole of sorbitol and its mono- and di-anhydrides.

Polysorbate 80 is a mixture of oleate partial esters of sorbitol and sorbitol anhydrides condensed with approximately 20 moles of ethylene oxide (C_2H_4O) for each mole of sorbitol and its mono- and di-anhydride.

Polysorbate 40 is an ethoxylated sorbitan monopalmitate containing 20 ethylene oxide groups, and is a non-ionic surfactant which is included in the EEC list of permitted food additives (see proposal for a Council Directive on food additives other than colours and sweeteners (92/C206/03) Official Journal of the European Communities No. C206/12, 13.8.92).

These Polysorbate non-ionic surfactants are available commercially from a variety of suppliers, for example Polysorbates 20, 40, 60 and 80 are sold by ICI as Tween 20, Tween 40, Tween 60 and Tween 80, respectively, or by Croda as Crillet 1, Crillet 2, Crillet 3 and Crillet 4, respectively, or by Seppic as Montanox 20, Montanox 40, Montanox 60, Montanox 80, respectively.

The proportions of the anionic surfactant (a), acid (b) and non-ionic surfactant (c) in the formulation are chosen to provide the best compromise between the various desired properties of the formulation (i.e. disinfectant activity, concentrate stability, and hard water stability). The upper concentration limit for the anionic surfactant (a), usually sodium lauryl sulphate, is determined by the need to incorporate the other components (particularly the acid (b) and the non-ionic surfactant (c)) into the formulations in amounts which give a suitable balance between the desired properties.

As the concentration of the sodium alkyl sulphate (a) is increased, the amount of acid (b) must be increased in rder to neutralise the alkalinity of the

sodium alkyl sulphate. The disinfectant composition shows optimum disinfectant activity below pH3 (approximately).

Furthermore, as the amount of sodium alkyl sulphate is increased, the amount of non-ionic surfactant (c) must be increased in order to maintain the stability of the disinfectant composition when it is diluted in hard water. However, as the concentration of non-ionic surfactant is increased relative to the concentration of sodium alkyl sulphate (a), the biocidal properties of the disinfectant are reduced.

Likewise, lowering the concentration of sodium alkyl sulphate (a) in the formulation reduces the disinfectant activity of the formulation. The lower limit of 1% anionic surfactant (a) represents the concentration in a formulation that would be used neat, without further dilution.

The amount of the non-ionic surfactant (c) which is usually present in the disinfectant compositions of the present invention is from 1.5 to 22 wt%, advantageously from 6 to 12 wt%, preferably from 6 to 10 wt%, more preferably about 8 wt%, based on the total weight of the disinfectant composition.

The non-ionic surfactant (c) may include a proportion consisting of non-ethoxylated partial esters of sorbitan, provided that the resultant mixture remains readily soluble in water. These esters are typically sorbitan laurate, palmitate, stearate, oleate, tristearate, trioleate and sesquioleate, and are sold under the trade mark of "Crills" by Croda or as "Spans" by ICI.

Typically, the amount of the acid (b) which is present in the composition is from 2 to 28 wt%, preferably from 7 to 13 wt%, more preferably about 10 wt%, based on the total weight of the disinfectant composition.

The disinfectant compositions of the present invention are intended for use as disinfectants in food and beverage manufacturing, and are typically intended for use in cleaning and disinfecting machinery and work surfaces which have been used in the preparation of foodstuffs and beverages. They will also be suitable for use in restaurants, sandwich bars, and fast-food outlets. The

compositions are intended to be sprayed on the surfaces to be cleaned and disinfected, or to be wiped on to such surfaces, with the optional step of rinsing the surfaces after the disinfectant composition has been applied thereto. Alternatively, equipment to be cleaned can be immersed in the disinfectant composition.

Accordingly, the various components in the disinfectant compositions of the invention must be selected so as to be compatible with foodstuffs and beverages in case traces of the disinfectant remain on the surfaces which have been treated with the disinfectant composition.

The disinfectant composition of the invention may also include as further components an antimicrobial agent (d), a solvent (e) and/or a food-compatible ammonium compound (f). The presence of one or more of these further components enables concentrated forms of the disinfectant to be stable for periods of at least a month when stored at room temperature and in some cases even when stored at temperatures down to -1°C.

The antimicrobial agent (d) is chosen from at least one of propionic acid, calcium, sodium or potassium propionate; C_6 - C_{12} fatty acids, especially caprylic acid; benzoic acid, sodium benzoate; methyl parahydroxy benzoic acid, ethyl parahydroxy benzoic acid, propyl parahydroxy benzoic acid and their sodium salts; sorbic acid, potassium sorbate and calcium sorbate; dehydroacetic acid and sodium dehydroacetate; sodium diacetate; erythorbic acid and sodium erythorbate.

When the antimicrobial agent (d) is a C_6 - C_{12} fatty acid, such as caprylic acid, propionic acid, calcium, sodium or potassium propionate, dehydroacetic acid, sodium dehydroacetate, sodium diacetate, erythorbic acid or sodium erythorbic acid, the amount of the antimicrobial agent which is usually present in the composition is from 0.3 to 6 wt%, preferably from 1.5 to 2.5 wt%. more preferably about 2 wt%, based on the total weight of the disinfectant composition.

When the antimicrobial agent (d) is benzoic acid, sodium benzoate; methyl parahydroxy benzoic acid, ethyl parahydroxy benzoic acid, propyl parahydroxy benzoic acid or their sodium salts; sorbic acid, potassium sorbate or calcium sorbate, the amount of antimicrobial agent which is usually present in the composition is from 0.2 to 3 wt%, preferably 0.5 to 1.5 wt%, more preferably about 1 wt%, based on the total weight of the disinfectant composition. Some of these antimicrobial agents may not be soluble at the upper end of the quoted concentration ranges; accordingly, the maximum amount of these antimicrobial agents which may be incorporated in the disinfectant compositions will depend on the solubility of the antimicrobial agent.

The solvent (e) is chosen from isopropanol, ethanol, glycerol, propylene glycol, and 1,3-butylene glycol and is preferably isopropanol. The amount of the solvent which is present in the composition is usually from 0.5 to 20 wt%, preferably from 3 to 10 wt%, more preferably about 7.5 wt%, based on the total weight of the disinfectant composition.

The food-compatible ammonium compound (f) comprises an ammonium compound approved for food or beverage use chosen from ammonium citrate, ammonium phosphate, ammonium sulphate and ammonium nitrate. Ammonium sulphate is preferred. The amount of ammonium compound usually present in the composition is from 0.5 to 3.0 wt%, preferably 1.5 to 2.5 wt %, more preferably about 2 wt %.

The disinfectant compositions of the present invention are usually prepared by dissolving the various components of the composition in soft water. Usually the anionic surfactant (a) is added to the water first which is stirred or agitated until the surfactant has dissolved, whereupon the remaining ingredients are added to the resultant solution. The solution is stirred or agitated until all the ingredients have dissolved.

As indicated above, the disinfectant compositions of the present invention are liquids which are stable when diluted with hard water, usually for at least 5 to 24 hours. Furthermore, in the presence of the antimicrobial agent (d), the

solvent (e) or the ammonium compound (f), the concentrated forms of the disinfectant compositions of the present invention are normally stable for at least 2 months at room temperature. Ideally, the concentrated form of the disinfectant composition should be stable for 6 to 12 months at room temperature and for at least 2 months at temperatures down to -1°C.

The compositions are normally sold as concentrates, to be diluted in use. Typically dilution is such that 2% by weight of the concentrate is added to water to form the end product which is to be sprayed onto, or applied manually to, e.g. by wiping, the surfaces to be cleaned and disinfected. Subsequent rinsing of the treated surfaces is not essential, but may be desirable or required by appropriate legislation imposing regulations governing food hygiene.

The invention is illustrated by the following Examples.

EXAMPLE 1

A disinfectant liquid composition was prepared from the following components:-

Component	Quantity (wt%)
Sodium lauryl sulphate	7
Citric Acid	10
Polysorbate 80 (Tween 80)	8
Caprylic Acid	2
Isopropanol	3.4

The anionic surfactant (sodium lauryl sulphate) was dissolved with mechanical stirring in water. The remaining ingredients were added to the resultant solution, and stirring of the solution was continued until all the ingredients had dissolved.

The resultant composition was stable for more than 3 months at ambient temperature as a concentrate and stable for more than 72 hours at ambient temperature when diluted to 2% w/w in hard water (World Health Organisation, 300 ppm as $CaCO_3$).

A 2% w/w solution was biocidal against a range of bacteria. It was examined according to the test method proposed by CEN (European Committee for Standardization) for the evaluation of bactericidal activity of chemical antiseptics and disinfectants in food, industrial, domestic and institutional areas (see Document CEN/TC 216/WG 3 N34 E-C-4) but with the modification that the test temperature was reduced from 20°C to 10°C. The following results were obtained:

CONDITIONS : Soil, 0.3% w/v Bovine Serum Albumin
Hard water, 300ppm as $CaCO_3$
Contact temperature, 10°C
Contact time, 5 minutes

ORGANISM	LOG REDUCTION OF VIABILITY
Pseudomonas aeruginosa	>6.3
Escherichia coli	5.4
Yersinia enterocolitica	>6.3
Enterococcus faecium	>5.9
Salmonella typhimurium	>6.5
Staphylococcus aureus	>6.4
Listeria monocytogenes	>6.2
Bacillus cereus	>5.2

EXAMPLE 2

Example 1 was repeated, but the disinfectant composition was formulated from the following components:-

Component	Quantity (wt%)
Sodium lauryl sulphate	7
Citric Acid	7
Polysorbate 20 (Tween 20)	8
Caprylic Acid	2
Isopropanol	3.4

This composition was also an effective food-compatible disinfectant.

The resultant composition was stable for more than 1 month at ambient temperature as a concentrate and was stable for more than 72 hours at ambient when diluted to 2% w/w in hard water (World Health Organisation, 300 ppm as $CaCO_3$).

A 2% w/w solution was biocidal against bacteria and yeast according to the European Suspension Test protocol entitled "Test Methods for the antimicrobial activity of disinfectants in food hygiene" published by the Council of Europe (Strasbourg 1987). The nature of the soil was modified as shown below. The following results were obtained:-

CONDITIONS : Soil as shown below
Contact temperature, 20°C
Contact time, 5 minutes

ORGANISM	SOIL	LOG REDUCTION OF VIABILITY
Pseudomonas aeruginosa	Distilled Water	>6
	Hard Water (300 ppm as $CaCO_3$)	>6
	300 ppm Hard Water + 0.03% BSA	>6
Escherichia coli	Distilled Water	>6
	Hard Water (300 ppm as $CaCO_3$)	>6
	300 ppm Hard Water + 0.03% BSA	>6
Staphylococcus aureus	Distilled Water	>6
	Hard Water (300 ppm as $CaCO_3$)	>6
	300 ppm Hard Water + 0.03% BSA	>6
Saccharomyces cerevisiae	Distilled Water	>5
	Hard Water (300 ppm as $CaCO_3$)	>5
	300 ppm Hard Water + 0.03% BSA	>5

BSA = Bovine Serum Albumin

EXAMPLE 3

Component	Quantity (wt%)
Sodium lauryl sulphate	7
Sodium benzoate	1.5
Citric acid	3

Phosphoric acid (75%)	3.5
Polysorbate 80 (Tween 80)	11
Isopropanol	3.4

The anionic surfactant (sodium lauryl sulphate) was dissolved with mechanical stirring in water. Sodium benzoate was dissolved similarly. The remaining ingredients were added to the resultant solution and stirring of the solution was continued until all the ingredients had dissolved.

The resultant composition was biocidal. The biocidal properties of the composition were tested as follows:-

CONDITIONS Modified European Suspension Test
Concentration, 2% w/w
Soil, modified as shown below
Contact Temperature, 20°C
Contact Time, 5 minutes

ORGANISM	SOIL	LOG REDUCTION OF VIABILITY
Escherichia coli	Hard Water (300 ppm as $CaCO_3$)	>6

EXAMPLE 4

Example 1 was repeated, but the disinfectant composition was formulated from the following components:-

Component	Quantity (wt%)
Sodium lauryl sulphate	7
Citric Acid	10
Polysorbate 80 (Tween 80)	8

Caprylic Acid	2
Isopropanol	7.5

This composition was also an effective food-compatible disinfectant.

The resultant composition was stable for more than 6 months at ambient temperature and at -1°C as a concentrate and was stable for more than 48 hours at ambient when diluted to 2% w/w in hard water (World Health Organisation, 300 ppm as $CaCO_3$).

The resultant composition was biocidal. The biocidal properties of the composition were tested as follows:-

CONDITIONS	Modified European Suspension Test
	Concentration, 2% w/w in hard water (300 ppm as $CaCO_3$)
	Soil, Bovine Serum Albumin (BSA) as shown below
	Contact Temperature 10°C (bacteria)
	20°C (fungi)
	Contact Time, 5 minutes (bacteria)
	15 minutes (fungi)

Bacteria, 10°C, 5 minutes

ORGANISM	SOIL	LOG REDUCTION OF VIABILITY
Pseudomonas aeruginosa	Hard Water (300ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6
Escherichia coli	Hard Water (300ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6
Staphylococcus aureus	Hard Water (300ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6
Yersinia enterocolitica	Hard Water (300ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6
Salmonella typhimurium	Hard Water (300 ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6
Enterococcus faecium	Hard Water (300 ppm as $CaCO_3$)	
	+ 0.03% w/v BSA	>6
	+ 0.3% w/v BSA	>6

Listeria monocytogenes	Hard Water (300 ppm as $CaCO_3$) + 0.03% w/v BSA + 0.3% w/v BSA	 >6 >6
Bacillus cereus	Hard Water (300 ppm as $CaCO_3$) + 0.03% w/v BSA + 0.3% w/v BSA	 >6 >6

Fungi , 20°C, 15 minutes

ORGANISM	SOIL	LOG REDUCTION OF VIABILITY
Saccharomyces cervisiae	Hard Water (300 ppm as $CaCO_3$) Hard Water + 0.03% w/v BSA	 >6 >5
Candida albicans	Hard Water (300 ppm as $CaCO_3$) Hard Water + 0.03% w/v BSA	 >6 >6

EXAMPLE 5

Example 1 was repeated, but the disinfectant composition was formulated from the following components:-

Component	Quantity (wt %)
Sodium lauryl sulphate	7
Citric Acid	10
Polysorbate 80 (Tween 80)	8
Sodium benzoate	1
Isopropanol	7.5

This component was also an effective food-compatible disinfectant.

The resultant composition was stable for more than 1 month at ambient temperature as a concentrate and was stable for more than 72 hours at ambient when diluted to 2% w/w in hard water (World Health Organisation, 300 ppm as $CaCO_3$).

The resultant composition was biocidal. The biocidal properties of the composition were tested as follows:-

CONDITIONS : Modified European Suspension Test
Concentration, 2% w/w
Soil, 300 ppm Hard water
Contact Temperature 20°C
Contact Time, 5 minutes

ORGANISM	SOIL	LOG REDUCTION OF VIABILITY
Pseudomonas aeruginosa	Hard Water (300ppm as $CaCO_3$)	>6
Staphylococcus aureus	Hard Water (300ppm as $CaCO_3$)	>6
Escherichia coli	Hard Water (300ppm as $CaCO_3$)	>6

EXAMPLE 6

Example 1 was repeated, but the disinfectant composition was formulated from the following components:-

Component	Quantity (wt %)
Sodium lauryl sulphate	7
Phosphoric Acid	8
Polysorbate 80 (Tween 80)	12
Ammonium sulphate	2
Isopropanol	7.5

This composition was also an effective food-compatible disinfectant.

The resultant composition was stable for more than 2 months at ambient temperature as a concentrate and at -1°C and was stable for more than 48 hours at ambient when diluted to 2% w/w in hard water (World Health Organisation, 300 ppm as $CaCO_3$).

A 2% w/w solution was biocidal against bacteria and yeast according to the modification of the European Suspension Test protocol entitled "Test Methods for the antimicrobial activity of disinfectants in food hygiene" published by the Council of Europe (Strasbourg 1987). The nature of the soil was modified as shown below. The following results were obtained:-

CONDITIONS : Soil as shown below
Contact temperature 10°c
Contact Time, 5 minutes

ORGANISMS	SOIL	LOG REDUCTION OF VIABILITY
Pseudomonas aeruginosa	Hard Water (300ppm as CaCO)	>6
	Hard Water + 0.3%w/v BSA	>6
Staphylococcus aureus	Hard Water (300ppm as CaCO)	>5.9
	Hard Water + 0.3%w/v BSA	>5.9
Escherichia coli	Hard Water (300ppm as CaCO)	>6.3
	Hard Water + 0.3%w/v BSA	>6.3
Saccharomyces cerevisiae	Hard Water (300ppm as CaCO)	>5.5
	Hard Water + 0.3w/v BSA	2.5

Although preferred embodiments of the invention are described herein in detail, it will be understood by those skilled in the art that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

CLAIMS

1. A disinfectant composition which is compatible with foodstuffs and beverages, said composition comprising.-

(a) an anionic surfactant chosen from an alkali metal salt of a C_{10} - C_{18} alkyl sulphate and an alkali metal salt of di (C_6 - C_{10} alkyl) sulphosuccinate;

(b) an acid selected from citric acid, phosphoric acid, sulphuric acid, hydrochloric acid, acetic acid, gluconic acid, lactic acid, propionic acid, malic acid and tartaric acid; and

(c) a non-ionic surfactant which comprises a polyethoxylated sorbitan ester which is readily soluble in water.

2. A disinfectant composition according to Claim 1, wherein the anionic surfactant is sodium lauryl sulphate and/or sodium dioctyl sulphosuccinate.

3. A disinfectant composition according to Claim 1 or 2, wherein the amount of the anionic surfactant (a) which is present in the composition is from 1 to 20 wt%, preferably from 5 to 9 wt%, more preferably about 7 wt%, based on the total weight of the disinfectant composition.

4. A disinfectant composition according to Claim 1, 2, or 3, wherein the amount of the acid (b) which is present in the composition is from 2 to 28 wt%, preferably from 7 to 13 wt%, more preferably about 10 wt%, based on the total weight of the disinfectant composition.

5. A disinfectant composition according to any one of the preceding claims, wherein the non-ionic surfactant (c) comprises a polyethoxylated sorbitan ester selected from ethoxylated sorbitan monolaurate, ethoxylated

sorbitan monopalmitate, ethoxylated sorbitan monostearate, and ethoxylated sorbitan mono-oleate.

6. A disinfectant composition according to Claim 5, wherein the polyethoxylated sorbitan ester contains 20 moles of ethylene oxide.

7. A disinfectant composition according to any one of the preceding claims, wherein the non-ionic surfactant (c) is chosen from at least one of Polysorbate 20, Polysorbate 40, Polysorbate 60 and Polysorbate 80.

8. A disinfectant composition according to any one of the preceding claims, wherein the amount of the non-ionic surfactant (c) which is present in the composition is from 1.5 to 22 wt%, preferably from 6 to 10 wt%, more preferably about 8 wt%, based on the total weight of the disinfectant composition.

9. A disinfectant composition according to any one of the preceding claims, which further comprises (d) an antimicrobial agent chosen from at least one of propionic acid, calcium, sodium or potassium propionate; C_6 - C_{12} fatty acids, preferably caprylic acid; benzoic acid, sodium benzoate; methyl parahydroxy benzoic acid, ethyl parahydroxy benzoic acid, propyl parahydroxy benzoic acid and their sodium salts; sorbic acid, potassium sorbate and calcium sorbate; dehydroacetic acid and sodium dehydroacetate; sodium diacetate; erythorbic acid and sodium erythorbate.

10. A disinfectant composition according to Claim 9, wherein the antimicrobial agent (d) is a C_6 - C_{12} fatty acid, propionic acid, calcium, sodium or potassium propionate, dehydroacetic acid, sodium dehydroacetate, sodium diacetate, erythorbic acid or sodium erythorbate, and the amount of the antimicrobial agent which is present in the composition is from 0.3 to 6 wt%,

preferably from 1.5 to 2.5 wt%, more preferably about 2 wt%, based on the total weight of the disinfectant composition.

11. A disinfectant composition according to Claim 9, wherein the antimicrobial agent (d) is benzoic acid, sodium benzoate; methyl parahydroxy benzoic acid, ethyl parahydroxy benzoic acid, propyl parahydroxy benzoic acid or their sodium salts; sorbic acid, potassium sorbate or calcium sorbate, and the amount of antimicrobial agent which is present in the composition is from 0.2 to 3 wt%, preferably 0.5 to 1.5 wt%, more preferably about 1 wt%, based on the total weight of the disinfectant composition.

12. A disinfectant composition according to any one of the preceding claims, which further comprises (e) a solvent chosen from isopropanol, ethanol, glycerol, propylene glycol, and 1,3-butylene glycol.

13. A disinfectant composition according to Claim 12, wherein the solvent (e) is isopropanol.

14. A disinfectant composition according to Claim 12 or Claim 13, wherein the amount of the solvent (e) which is present in the composition is from 0.5 to 20 wt%, preferably from 3 to 10 wt%, more preferably about 7.5 wt%, based on the total weight of the disinfectant composition.

15. A disinfectant composition according to any one of the preceding claims, which further comprises (f) a food-compatible ammonium compound chosen from ammonium citrate, ammonium phosphate, ammonium sulphate and ammonium nitrate.

16. A disinfectant composition according to claim 15, wherein the amount of the food-compatible ammonium compound which is present in the composition

is from 0.5 to 3.0 wt%, preferably 1.5 to 2.5 wt%, more preferably about 2 wt%, based on the total weight of the disinfectant composition.

INTERNATIONAL SEARCH REPORT

[redacted] Application No
[redacted]CA 95/00537

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01N25/30 A01N41/02 A01N41/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,3 650 964 (R.M. SEDLIAR ET AL.) 21 March 1972 cited in the application see column 1, line 45 - column 2, line 53	1-16
A	DE,A,32 29 097 (SCHÜLKE & MAYR) 9 February 1984 see claims see page 11, paragraph 2 & CA,A,1 244 759 (ID) cited in the application	1-16
A	DE,A,35 19 557 (INTERKEMIA VEGYIPARI GAZDASAGI TARSASAG) 5 December 1985 cited in the application see claim 1 see page 7, line 18 - line 23	1,5-7, 12-14

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 December 1995	29.12.95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Decorte, D

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INTERNATIONAL SEARCH REPORT

[redacted]rmation on patent family members

[redacted]al Application No
[redacted]A 95/00537

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		US-A-	5280042	18-01-94

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 95/00537

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,92 09260 (MICROCIDE) 11 June 1992 cited in the application see page 1, line 29 - page 2, line 25	1